ARGUMENTS

At the time the Office Action issued, claims 1-15, 17-30, 34-75 were pending.

Claims 52 to 63 have been allowed, for which the Examiner is respectfully thanked. The Examiner has also indicated dependent claims 26-30, 40, and 48 to contain allowable subject matter, for which the Examiner is also respectfully thanked. The Applicant agrees, but has chosen not to rewrite these claims in independent form in view of the arguments presented below that show that none of the rejections made on the base claims are supported by the art and that no *prima facie* case of obviousness has been established regarding any one of the base claims.

Rejections made in Numbered Paragraphs 4 and 5 of the Office Action

Claims 1-6, 19-22, 25, 37, 43, and 49-50 have been rejected under 35 USC § 102(b) as being anticipated by Goodwin *et al* (US Pat. 6,490,916 – hereinafter Goodwin).

Attorney for Applicant respectfully traverses the rejections.

Regarding claim 1, Numbered paragraph 5 of the Office Action states that Goodwin discloses an apparatus (see Fig. 10) for acoustically analyzing a fluid comprising:

a chamber (sample bottle 300) for holding the fluid;

a transmitter (322) positioned within the chamber (300) for transmitting an acoustic signal through the fluid;

a reflector (324) positioned within the fluid for reflecting the acoustic signal;

a receiver (322) positioned within the chamber (300) for detecting a reflection of the acoustic signal;

wherein said apparatus is incorporated in a downhole sampling (the sample bottle can be used either downhole, as part of a downhole sampling tool, or on the surface, see: col. 11, lines 4-6).

The Office Action states that claim 14 is similar in scope with claim 1 and therefore it has been rejected for the same reasons set forth for that claim.

Attorney for Applicant respectfully submits that the rejection is not supported by the cited art because:

1. Goodwin does not disclose a reflector at 324 positioned within the fluid to be analyzed; and
2. Part 322 is not a "receiver" for detecting a reflection of the acoustic signal.

Goodwin discloses (see paragraph bridging Cols. 9 and 10) an apparatus provided with a piston 320 that includes a phase transition detector 322. The detector 322 uses an acoustic transducer to generate the presence of bubbles and to detect the presence of

bubbles in a fluid sample that is present in the sample region 306 of the sample bottle 300. Acoustic energy from the transducer 322 is emitted from portion 324 that protrudes from piston 320 into the sample region 306. Hence, contrary to the Examiner's statement, portion 324 is not a "reflector", but it is a protrusion which emits the acoustic energy into the fluid sample.

Further, Goodwin's technique does not call for detecting a reflection of the acoustic signal. Instead, it works, as explained in Col. 9 line 65 to Col. 10 line 38. The transmission of acoustic energy into the fluid causes the creation of bubbles or a phase transition in the fluid. These bubbles are detected by a change in electrical impedance in the transducer. Using this, Goodwin detects the bubble point, thereby characterizing the fluid. Goodwin does not measure an acoustic reflection from the reflector as set forth in claim 1 or claim 14.

Thus, the Examiner's statements are not supported by the art and claims 1 and 14 are patentable over Goodwin. Since claims 2-13, 37-40, and 64 depend from and include all of the limitations set forth in claim 1, they are likewise patentable over Goodwin. Similarly, claims 15, 17-19, 41-48 and 65 depend from and include all of the limitations set forth in claim 14, they are also patentable.

Regarding claim 20, the Office Action states that Goodwin discloses a method for acoustically analyzing a fluid in a chamber using a transmitter, a substantially stationary reflector movably positioned within the fluid inside the chamber, and a receiver, the method comprising the steps of:

drawing a formation fluid from an earth formation (production tubing 240 is shown penetrating land surface 202, and down through to the reservoir 206, see: col. 6 lines 17-19); and under in situ conditions (real time monitoring) transmitting (220) an acoustic signal from the transmitter through the fluid; and detecting (222) reflections of the acoustic signal from the reflector at the receiver. (see also col. 6, lines 13-65).

Attorney for Applicant respectfully submits that this rejection is not supported by the art.

The statement that transmitting (220) an acoustic signal and detecting (222) reflections of the acoustic signal is incorrect. Each of 220 and 222 in Goodwin are equivalent sensors that operate independently. Sensors 220 are shown in the production zone. In Col. 6 lines 31-40, Goodwin explains that other locations are also possible, depending on what part of the production process is being controlled. Sensor 222 is merely an example of such an other location. Goodwin does not disclose or teach detecting reflections of the acoustic signals from a reflector. Instead, as explained in Col. 9 line 65 to Col. 10 line 38 and summarized in the abstract and in claim 1, Goodwin teaches measuring variations in electrical impedance of the transducer as it is operated to transmit the acoustic energy into the fluid.

Therefore, Goodwin does also not disclose or teach using a substantially stationary reflector movably positioned within the fluid inside the chamber and using a receiver such as called for in independent claim 20. Accordingly, claim 20 is patentable over Goodwin. As claims 21 – 30 and 34 – 36 depend from and include all of the limitations of claim 20, they are likewise patentable.

Regarding claim 49, the rejection states that Goodwin discloses the preferred method of determining the pressure applied to the fluid by using difference methods to solve the equations for acoustic propagation related to intensities of waves traveling through different media. The physical properties (such as speed of sound, viscosity, and density) of the materials used to construct the transducer, the fluid surrounding it, and the physical dimensions are preferably used as inputs to a suitable program for finite element solutions to propagation of acoustic waves. The acoustic impedance of a material is defined as the product of its mass density and sound speed. In one implementation of the invention, the acoustic impedance of the transducer is approximately matched to the acoustic impedance of the fluid, in the absence of bubbles. At the first appearance of a bubble, both the density and the sound speed of the fluid decrease (col 8 lines 25-35).

Attorney for Applicant respectfully remarks that the rejection fails to consider the claim in its entirety.

The following features are not discussed by the Examiner:

- a reflector positioned within the fluid for reflecting the acoustic signal; and

- a receiver positioned within the chamber for detecting a reflection of the acoustic signal,

- the reflector comprises a material having a substantially low coefficient of thermal expansion and a high bulk modulus for mitigating any variation in a distance between the first reflective surface and the second reflective surface as the material is subjected to a predetermined temperature and pressure within the chamber.

Since (as explained above regarding claim 1) Goodwin does not disclose a reflector nor a receiver for detecting a reflection of the acoustic signal, it cannot anticipate claim 49. Accordingly, claim 49 and its dependent claims 50 and 51 are patentable over Goodwin.

Attorney thanks the Examiner for the allowance of claims 52 – 63.

Regarding claim 66, the same rejection has been applied as to claim 1/2/3. Attorney for Applicant has explained above that the rejection of claim 1 should be withdrawn because Goodwin does not teach or disclose

1. a reflector at 324; and
2. a "receiver" 332 for detecting a reflection of the acoustic signal.

Since claim 66 also calls for a reflector and a receiver for detecting a reflection of the acoustic signal, and this is absent from Goodwin, Goodwin cannot anticipate claim 66. Accordingly, claim 66 and its dependent claims 67 – 75 are patentable over the cited art.

Finally, Examiner's attention is respectfully drawn to claim 19. This claim is stated to have been rejected (see first line of Numbered paragraph 5 of the Office Action), but the rejection has not been explicitly substantiated in the remainder of paragraph 5 of Office Action. Since claim 18, on which claim 19 depends, has not been rejected as anticipated by Goodwin, it is assumed that the stated rejection of claim 19 was in fact not intended by the Examiner.

Rejections made in Numbered Paragraph 6 of the Office Action

In Numbered Paragraph 6 of the Office Action, claims 7-8, 44-45, and 71-72 have been rejected under 35 USC 103(a) as being unpatentable over Goodwin in view of Harth III *et al* (US Pat. 5,661,241).

As noted above, Goodwin does not disclose or suggest a square-wave pulser/receiver connected to the transducer and an oscilloscope connected to the square-wave pulser/receiver. Harth III, according to the Office Action, shows in Fig. 4 pulser/receiver 36 connected to oscilloscope 32 and transducer 40. The Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the techniques of Harth III in combination with Goodwin, because it would provide ultrasonic transducer 40 which detects the ultrasonic pulses from both the base metal/clad interface and cladding/air interface and it, in combination with the pulser/receiver 36, converts these pulses into electrical signals and the high frequency oscilloscope 32, or for that matter any device capable of displaying high frequency wave forms in real time, displays the transmitted and received wave forms thereby making the above combination more effective.

Attorney for Applicant respectfully traverses the rejections.

Establishing a *prima facie* case of obviousness requires that the cited combination of references teach or suggest each claimed element (see MPEP 2142 and 2143).

In the present case, the rejected claims 7-8, 44-45, and 71-72 respectively depend on claim 1, claim 14, and claim 66 and therefore the cited combination should teach every element of the applicable base claims, as well, in order to establish the *prima facie* case of obviousness. Attorney has set forth above that Goodwin does not disclose a reflector positioned within the fluid. Moreover, Harth III does not disclose or suggest a reflector positioned within a fluid, either. In fact, Harth III is not even aimed at analyzing a fluid in the way as Goodwin is, but it is aimed at measuring thickness of a non-welded cladding layer.

Thus, the cited combination fails to disclose or suggest every claimed element of claim 1, or claim 14, or claim 66, and no *prima facie* case of obviousness has been established.

Moreover, there is no suggestion of motivation to combine the cited references. Harth III is concerned with measuring clad layer thickness the outside wall of the vessel, while Goodwin is concerned with fluid analysis, in particular with bubble formation properties of the fluid. So the motivation that the Examiner has relied upon (Harth III would provide ultrasonic transducer 40 which detects the ultrasonic pulses from both the base metal/clad interface and cladding/air interface) is not of any relevance to Goodwin's technology. Therefore, it would not realistically provide motivation the person of ordinary skill to apply to Goodwin Harth III's teaching.

The cited references even teach away from each other. Goodwin's disclosure fully relies on the acoustic energy's capability of creating cavitation. This determines an expected frequency requirement (see paragraph bridging Col. 7 and Col. 8) wherein the transmitted acoustic frequency is in the range of 1 kHz and 50 kHz, with about 40 kHz found suitable for certain applications. In any case, the frequency is preferably less than 1 MHz. Harth III, on the other hand, teaches operation at a frequency of 15 MHz to 100 MHz (see Col. 6 lines 2-6). However, such high frequencies of around 2 or even 3 orders of magnitude higher than Goodwin, would compromise the operation of the primary reference (Goodwin) because no cavitation would be expected to occur.

So also for that reason, no *prima facie* case of obviousness has been established.

The MPEP (section 2142) requires that the Examiner sets forth a *prima facie* case of obviousness before the burden shifts to the Applicant. Since no *prima facie* case of obviousness has been established, for want of disclosing all claimed elements and for want of motivation to comb ine, withdrawal of the rejections based on the combination of Goodwin in view of Harth III is respectfully requested.

Rejections made in Numbered Paragraph 7 of the Office Action

In Numbered Paragraph 7 of the Office Action, claims 9-13, 17-19, 23-24, 34-36, 38-39, and 41-42, 46-47, and 51 have been rejected under 35 USC 103(a) as being unpatentable over Goodwin in view of Harth III *et al* and further in view of Wilkins (US Pat. 5,900,546).

The Office Action states that Goodwin in view of Harth III does not disclose the reflector is a disc and a ring positioned opposite the transducer relative to the piston. The Office Action then states that Wilkins discloses a pison 29 is located inside tube 12, freely slidable therein and has a magnet 32 fixed to the bottom which is magnetically coupled to the magnet 27 in the float (allegedly meeting the limitations of claims 11, 17, and 51). The top of the piston provides a flat, circular, ring-shaped surface 34 at a known distance from the flat circular bottom surface 36 of the bore (see: col. 2 lines 38-50). It would, according to the Examiner, have been obvious to one having ordinary skill in the art at the time of the

invention to utilize in Goodwin in view of Harth III the techniques of Wilkins because it would provide a piston having a circular shape with a known distance between reflecting surfaces and which is used in the computer for a reference and applied to the liquid level indication data to produce an output for temperature variations thereby, making the above combination more efficient.

Attorney for Applicant respectfully traverses the rejections.

Establishing a *prima facie* case of obviousness required that the cited combination of references teach or suggest each claimed element.

In the present case, the each of rejected claims ultimately depends on one of the independent claims 1, 14, 20, 49, and therefore the cited combination should teach every element of the applicable base claim, as well, in order to establish the *prima facie* case of obviousness.

Attorney has set forth above that neither Goodwin nor Harth III discloses a reflector positioned within the fluid to be analyzed.

Wilkins fails to disclose or teach that feature, as well. Wilkins' piston 29 is located inside the tube 21, whereby the tube 21 is closed at the bottom 22 to keep the liquid 16 out.

In fact, Wilkins is not even aimed at analyzing a fluid in the way as Goodwin is, but it is aimed at measuring the level of the liquid in the tank.

Thus, at least for failing to disclose or suggest every claimed element of claim 1, or claim 14, or claim 20, or claim 49, no *prima facie* case of obviousness has been established.

Moreover, it would not have been obvious to the person of ordinary skill in the art to make the combination of Goodwin with Harth III for lack of motivation.

It would also not have been obvious to the person of ordinary skill in the art to make the combination of Goodwin with Wilkins.

Wilkins is aimed at measuring the liquid level in a tank, while Goodwin is concerned with fluid analysis, in particular with bubble formation properties of the fluid. Goodwin is not concerned at all about measuring reflections nor about the liquid level. In fact, the liquid in Goodwin always fully fills space 306 due to the presence of piston 320. So the motivation that the Examiner has relied upon (providing in Goodwin in view of Harth III a piston having a circular shape with a known distance between reflecting surfaces and which is used in the computer for a reference and applied to the liquid level indication data to produce an output for temperature variations thereby, making the above combination more efficient) is not of any relevance to Goodwin's technology. Moreover, Goodwin requires the ultrasonic energy to be transmitted into the liquid in chamber side 306 in order to generate cavitation. Wilkins teaches the ultrasonic energy to be transmitted into air. However, air does not cavitate the way a liquid does. Moreover, if Wilkinks' piston 29 would be positioned <u>within</u> the fluid, it would not be capable of measuring the liquid level.

Therefore, Wilkins' would not realistically present any motivation the person of ordinary skill to apply to Goodwin Wilkins' teaching.

It would also not have been obvious to combine Harth III with Wilkins. Harth III measures reflections from a metal/clad interface and a clad/air to measure clad thickness. It would not have been obvious to modify that with the piston of Wilkins because Wilkins piston requires a known distance x2-x1 while in Harth III the clad layer thickness is subject to determination using the reflections.

Concluding there is no motivation in the art to combine Goodwin with Harth III, nor to combine Goodwin with Wilkins, nor to combine Harth III with Wilkin. For any of these reasons, there would be no motivation to combine Goodwin in view of Harth III in further view of Wilkins.

Therefore, the Examiner has failed to present a *prima facie* case of obviousness, not only for want of motivation to combine, but also for want of teaching every claimed element. Consequently, the rejections must be withdrawn.

The failure to teach each claim limitation and to provide motivation to combine the references are reasons as such why there has also not been a *prima facie* case of obviousness presented against claims 11, 17, and 51.

Nevertheless, for completeness' sake, Attorney also respectfully traverses the Examiner's allegations that Wilkins' disclosure of the magnet 32 fixed to the bottom which is magnetically coupled to the magnet 27 in the float would meet the limitations of claims 11, 17, and 51. The Examiner has failed to consider the full claim language, which calls for first and second electromagnetic coils being independently drivable for manipulating the reflector. Wilkins does not disclose coils, neither does it suggest independently driving first and second coils.

So also for that reason, no *prima facie* case has been established against these dependent claims.

Concluding remarks

Attorney has addressed each and every ground for objection and rejection raised by the Examiner in the Office Action. Attorney respectfully submits that the claims, both new and as amended, are now in a state ready for allowance.

In the event the Examiner has any questions or issues regarding the present application, the Examiner is invited to call the undersigned prior to the issuance of any written action.

Respectfully submitted,

Michael Tolbert Myers *et al*

By _____

Attorney, Eugene R. Montalvo
Registration No. 32,790
(713) 241-0296

P.O. Box 2463
Houston, Texas 77252-2463